

# **Third Five-Year Review Report**

**For**

**Missouri Electric Works Site  
Cape Girardeau  
Cape Girardeau County, Missouri**

**June 2014**

**PREPARED BY:**

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## Table of Contents

List of Acronyms .....	i
Executive Summary .....	iii
Five-Year Review Summary Form .....	iv
<b>I. Introduction .....</b>	<b>1</b>
<b>II. Site Chronology .....</b>	<b>2</b>
<b>III. Background</b>	
Physical Characteristics .....	4
Land and Resource Use .....	4
History of Contamination .....	5
Initial Response .....	5
Basis for Taking Action .....	6
<b>IV. Remedial Actions</b>	
Remedy Selections .....	7
Remedy Implementation .....	9
System Operations/Operation and Maintenance (O&M) .....	11
<b>V. Progress Since the Last Five-Year Review .....</b>	<b>12</b>
<b>VI. Five-Year Review Process</b>	
Administrative Components .....	12
Community Involvement .....	12
Document Review .....	13
Data Review .....	13
Site Inspection .....	14
Interviews .....	14
<b>VII. Technical Assessment</b>	
Question A: Is the remedy functioning as intended by the decision documents? .....	14
Question B: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives (RAOs) used at the time of the remedy still valid? .....	15
Question C: Has any other information come to light that could call into question the protectiveness of the remedy? .....	15
Technical Assessment Summary .....	16
<b>VIII. Issues .....</b>	<b>16</b>

<b>IX.</b>	<b>Recommendations and Follow-up Actions .....</b>	<b>17</b>
<b>X.</b>	<b>Protectiveness Statement(s) .....</b>	<b>18</b>
<b>XI.</b>	<b>Next Review .....</b>	<b>18</b>

#### **Tables**

Table 1 – Chronology of Site Events

Table 2 – Issues

Table 3 – Recommendations and Follow-up Actions

#### **Attachments**

Figure 1 – Site Location Map

Figure 2 – Extent of Soil Contamination (OU 1)

Figure 3 – Site Plan

Figure 4 – Wetland

Attachment 4 – List of Documents Reviewed

## List of Acronyms

Acronym	Definition
1,1,1-TCA	1,1,1-Trichloroethane
1,1-DCA	1,1-Dichloroethane
1,1-DCE	1,1-Dichloroethene
1,2-DCE	1,2-Dichloroethene
1,2,4-TCB	1,2,4-Trichlorobenzene
1,2-DCB	1,2-Dichlorobenzene
1,3-DCB	1,3-Dichlorobenzene
1,4-DCB	1,4-Dichlorobenzene
ARAR	Applicable or Relevant and Appropriate Requirement
ATSDR	Agency for Toxic Substances and Disease Registry
BGS	Below Ground Surface
BHHRA	Baseline Human Health Risk Assessment
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CIC	Community Involvement Coordinator
EPA	United States Environmental Protection Agency
CFR	Code of Federal Regulations
DOJ	Department of Justice
ESD	Explanation of Significant Differences
FS	Feasibility Study
IC	Institutional Control
LTDD	Low Temperature Thermal Desorber
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDNR	Missouri Department of Natural Resources

<b>Acronym</b>	<b>Definition</b>
MEW	Missouri Electric Works
MEWSC	Missouri Electric Works Steering Committee
MEWSTD	Missouri Electric Works Site Trust Donors
MNA	Monitored Natural Attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PCB	Polynuclear Biphenyl "Polychlorinated" per previous FYR
PCE	Perchloroethene
PIC	Product of Incomplete Combustion
PPB	Parts per Billion
PPM	Parts per Million
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
TCE	Trichloroethene
TI	Technical Impracticability
TSCA	Toxic Substances Control Act
USGS	United States Geological Survey
VOC	Volatile Organic Compound

## Executive Summary

The soil remedy for the Missouri Electric Works Superfund site (Site) in Cape Girardeau, Missouri included the excavation, processing, and treatment of Polychlorinated Biphenyl -(PCB) contaminated soils using thermal desorption technology. Site soils were designated Operable Unit 1 (OU-1). After treatment and analysis to confirm that treatment standards had been met, the treated soil was used to backfill the excavated areas. The entire area was capped with a contaminant-free soil. The upper one foot of the cap was enriched to support vegetation. The soil remedy was complete with the acceptance by the Environmental Protection Agency (EPA) of the Soil Remedial Action Report during September 2000. The trigger for this five-year review (FYR) is the start of remedial action (RA) on-site construction, which occurred June 7, 1999.

The groundwater portion of the remedy at the Missouri Electric Works Superfund site, designated OU-2, has not yet been implemented. After the Record of Decision (ROD) was signed in 1990 (1990 ROD), new hydrogeologic information was obtained by the Missouri Electric Works Steering Committee (MEWSC). This new information indicated that there was a possibility that PCBs were present in the groundwater at depths greater than three hundred feet. Solution features were encountered at depths of 110, 220 and 315 feet below ground surface (bgs). The solution cavities at depths of 220 and 315 feet bgs were mud-filled; the mud and water were contaminated with PCBs. A focused remedial investigation and feasibility study for groundwater has been conducted for the site.

The EPA issued a second ROD in 2005 (2005 ROD) which addressed the two groundwater aquifers that had been impacted by contamination from the Site. A technical impracticability waiver for meeting the groundwater cleanup levels (maximum contaminant levels or MCLs), groundwater monitoring and institutional controls (ICs) were selected as components of the remedy for the contaminated groundwater in the fractured bedrock aquifer. Monitoring, ICs, and Monitored Natural Attenuation (MNA) were selected as components of the remedy for the contaminated groundwater in the alluvium south of the MEW property. These remedies have not yet been implemented.

Special Notice Letters seeking the performance of this work were issued by EPA to potentially responsible parties (PRPs) on March 4, 2009. An offer to perform certain of this work, under certain conditions, was received from the Missouri Electric Works Steering Committee (MEWSC) on May 6, 2009. Consent Decree (CD) negotiations are currently underway. The MEWSC initially requested that all remaining work be addressed through one settlement document. However, difficulties with the terms of the CD have resulted in EPA taking the alluvial aquifer portion of OU-2 Fund-lead, and the CD will address the fractured bedrock aquifer portion of OU-2 only. *new*

The site assessment conducted as part of this FYR found that the soil remedy was conducted in accordance with the requirements of the 1990 ROD. One Explanation of Significant Differences (ESD) to that ROD was issued by EPA in February 1995 to include onsite thermal desorption in addition to onsite incineration as acceptable methods of treating PCB-contaminated soils. The soil remedy is complete and functioning as designed. Construction of new buildings and associated earthmoving and regrading by the site owner occurred in 2011???. EPA evaluated these activities in 2013 and determined that the remedy was still protective of human health and the environment. Further, EPA determined that the restriction placed on the site prior to implementing the soil remedy was no longer needed and could be replaced by an Environmental Covenant. ) new

While there are no current unacceptable human exposures to contaminated groundwater in the immediate area, the threats posed by the contaminated groundwater have not yet been addressed. The groundwater components of the 1990 ROD have been superseded by the 2005 ROD. The 2005 ROD has not been implemented; therefore protectiveness has been achieved only for the soils. < gw threats not addressed

Wetlands adjacent and downgradient of the site have been designated as OU-3. Little investigation has been done in this area and an RI/FS is planned for OU-3. A separate Administrative Order with the PRPs to perform an RI/FS is planned. ) new



## Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name(from WasteLAN): <b>Missouri Electric Works</b>		
EPA ID (from WasteLAN): <b>MOD980965982</b>		
Region: <b>7</b>	State: <b>MO</b>	City/County: <b>Cape Girardeau/Cape Girardeau</b>
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
Remediation status (choose all that apply): <div style="text-align: center;"> <input checked="" type="checkbox"/> Under Construction        <input type="checkbox"/> Operating        <input checked="" type="checkbox"/> Complete </div>		
Multiple OUs? * <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Construction Complete Date: ____/____/____
Has site been put into reuse? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency		
Author name: <b>Dan Gravatt</b>		
Author title: <b>Remedial Project Manager</b>		Author affiliation: <b>U.S. EPA, Region 7</b>
Review period: ** <b>12/20/2008 to 06/30/2009</b>		
Date(s) of site inspection: <b>02/11/2009 &amp; 03/18/2009</b>		
Types of review: <div style="display: flex; justify-content: space-between;"> <div> <input checked="" type="checkbox"/> Post-SARA  <input type="checkbox"/> Non-NPL Remedial Action Site </div> <div> <input type="checkbox"/> Pre-SARA  <input type="checkbox"/> NPL State/Tribe-lead </div> <div> <input type="checkbox"/> NPL-Removal Only  <input type="checkbox"/> Regional Discretion </div> </div>		
Review number: <input type="checkbox"/> 1 (first) <input checked="" type="checkbox"/> 2(second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other(specify)		
Triggering Action: <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> Action RA On-site Construction at OU #1  <input type="checkbox"/> Construction Completion  <input type="checkbox"/> Other (specify) </div> <div> <input type="checkbox"/> Actual RA Start at OU # ____  <input checked="" type="checkbox"/> Previous Five-year Review Report </div> </div>		
Triggering action date (from WasteLAN): <b>June 7, 1999 (on-site construction OU 1), 1<sup>st</sup> Five Year Review August 2004</b>		
Due date (five years after triggering action date): <b>June 7, 2009</b>		

\* [OU refers to operable unit.]

\*\* [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

## Five-Year Review Summary Form, cont'd.

### Issues:

Institutional controls addressing potential groundwater exposures have not been placed on the site; this effort is currently being negotiated as part of the work under the new CD.

A wetland area south of the Missouri Electric Works (MEW) property has been impacted by contamination from the site. Additional investigation is necessary so that an Ecological Risk Assessment can be performed.

The groundwater monitoring data collected in the fractured bedrock and alluvium during the focused groundwater design investigation indicates that there are two contaminant plumes; however they do not appear to be migrating. Continued monitoring of the groundwater is needed to verify this.

Groundwater parameter data has been collected from the alluvium and indicates that natural attenuation is occurring. Continued monitoring of the alluvium groundwater; both for contaminants and those parameters necessary for natural attenuation needs to be performed.

### Recommendations and Follow-up Actions:

Institutional controls for groundwater, both fractured bedrock and alluvium, need to be established. The ICs are identified as part of the work to be performed pursuant to the CD that is currently being negotiated.

A focused remedial investigation and ecological risk assessment are needed for the wetland area. A ROD for the wetland (OU 3) will be needed after the data is available to identify any actions that may be required for protectiveness of the environment. These efforts are identified as part of the work to be performed pursuant to the CD that is currently being negotiated.

Another monitoring well nest is needed in the wetland area to verify that the extent of the contaminant plume has been adequately identified. Installation of up to three wells is identified as part of the work to be performed pursuant to the CD that is currently being negotiated.

Regular monitoring of both the fractured bedrock and alluvium groundwaters, is needed to verify that the plumes are not migrating and that contaminant concentrations are stable or decreasing. Groundwater monitoring, at regular specified intervals, is identified as part of the work to be performed pursuant to the CD that is currently being negotiated.

Additional groundwater data will be collected to evaluate whether parameters necessary for natural attenuation continue to exist in the alluvium. This work is as part of the effort to be performed pursuant to the CD currently being negotiated.

### **Protectiveness Statement(s):**

The soil remedy is protective of human health. The groundwater portion of the remedy has not been implemented. While there are no current unacceptable exposures, the groundwater could present a risk to human health through ingestion or inhalation. New standards have been instituted for ecological protectiveness since the 1990 ROD was issued. Additional work needs to be performed to determine whether or not there is an ecological risk. That work will be addressed through the CD that is currently being negotiated.

An investigation will be performed to gather the data necessary for the Ecological Risk Assessment. A determination will be made after the Ecological Risk Assessment is complete whether or not additional actions will be required for protectiveness of the environment.

### **Long-term Protectiveness:**

The completion of the soil remedial action (destruction of the PCBs in site soil) has resulted in the long-term protectiveness of human health with regard to exposure pathways posed by contaminated soil at the site.

As stated above, due to the post-1990 ROD discovery of contamination at depth in the groundwater, the groundwater remedy selected in the 1990 ROD was superseded by the 2005 ROD. The EPA and the MEWSC are currently negotiating a CD that will implement the remedies identified in the 2005 ROD. Once the ICs have been invoked and regular monitoring begins, the long-term protectiveness for groundwater will be achieved. (There is currently no use of groundwater in the area.)

The long-term protectiveness of the soil remedy as to the environment will be evaluated following the completion of the Ecological Risk Assessment and any actions required thereby have been taken. The long-term protectiveness of the soil and groundwater remedies as to the environment will be considered in EPA's next Five-Year Review for the site.

### **Other Comments:**

The EPA issued a new ROD for the groundwater operable unit in 2005. The groundwater remedy identified in the 1990 ROD is no longer applicable.

**Missouri Electric Works Superfund Site**  
**Cape Girardeau, Missouri**  
**First Five-Year Review Report**

Third?

**I. Introduction**

The purpose of the Five-Year Review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues, if any, found during the review, and identify recommendations to address such issues.

The EPA is preparing this Five-Year Review report pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Section 121(c) provides:

*If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section 104 or 106 [of CERCLA], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The EPA has interpreted this requirement further in the NCP; 40 C.F.R. § 300.430(f)(4)(ii) provides:

*If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.*

The EPA, Region 7, has conducted this Five-Year Review of the remedy implemented at the Missouri Electric Works (MEW) Superfund Site, in Cape Girardeau, Missouri. This review was conducted by Remedial Project Managers (RPM) Daniel Kellerman and Pauletta France-Isetts for the entire site from December 2008 through June 2009. This report documents the results of the review.

*2nd*

This is the second Five-Year Review for the Missouri Electric Works Site. The triggering action for this statutory review is completion of the first Five Year Review and the start of RA on-site construction, which occurred on June 7, 1999. The Five-Year Review is required due to the fact that hazardous substances, pollutants or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

## II. Site Chronology

Table 1 – Chronology of Site Events

Event	Date
Site discovery	10/25/1984
EPA-lead Expanded Site Investigation conducted	05/01/1987
PRP search initiated	01/15/1988
PRP lead RI/FS initiated	12/31/1988
Site listed on the NPL	02/21/1990
Remedial Investigation (RI) report submitted to EPA	06/04/1990
Record of Decision (ROD) signed	09/28/1990
Special Notice letters sent	12/21/1990
Good Faith Offer received	03/04/1991
PRPs perform post-ROD groundwater investigation with EPA oversight	07/06/1991
RD/RA Consent Decree negotiations conclude	09/19/1991
Consent Decree transmitted to all parties for signature	09/26/1991
Signed Consent Decree to sent to DOJ for lodging in federal court	12/30/1991
PRPs submit groundwater investigation report	01/09/1992
Additional PRPs identified	01/16/1992



Event	Date
EPA "approves" groundwater report after review	03/19/1992
Unidentified person(s) dumps tons of lime on site (additional material will require treatment)	05/1992
OSC samples materials dumped on site by persons unknown Civil investigator attempts to identify person(s) responsible	05/1992
Late parties signed consent decree	06/15/1992
DOJ files complaint, lodges Consent Decree	06/29/1992
District Court enters Consent Decree	08/29/1994
<i>De minimis</i> parties make payments to MEW trust and Superfund	09/1994
Settling Defendants retain Construction Management Contractor	09/1994
Appeal filed by Intervenor	10/28/1994
Settling Defendants submit information on thermal desorbers and request EPA to review and change ROD	10/1994
McLaren-Hart petitions EPA HQ for National TSCA permit demonstration at MEW site	10/1994
Availability session in Cape Girardeau to let public know that considering inclusion of thermal desorbers	12/14/1994
Explanation of Significant Differences to ROD issued by EPA	02/01/1995

<b>Event</b>	<b>Date</b>
Pilot study using innovative low temperature/high vacuum thermal desorber unit	05/15/1995
8 <sup>th</sup> Circuit Court of Appeals remands Consent Decree to District Court	08/1995
McLaren-Hart submits report on demonstration test at the MEW site	06/1996
DOJ lodges Consent Decree (second time)	06/29/1996
District court re-enters Consent Decree	08/14/1996
Intervenors appeal re-entry of Consent Decree	10/07/1996
8 <sup>th</sup> Circuit Court of Appeals re-affirms District Court's entry of Consent Decree	12/1997
Request for Proposal for soils contractor issued	05/1998
Williams Environmental Services selected as soils contractor	08/25/1998
Preliminary remedial design (RD) submitted	10/01/1998
Pre-final RD and draft Remedial Action Work Plan (RAWP) submitted	12/22/1998
100% RD and revised RAWP submitted	05/19/1999
RA on-site construction start	06/07/1999
Groundwater RI/FS start (OU 2)	06/12/2000
Final Inspection	09/19/2000

<b>Event</b>	<b>Date</b>
Remedial Action Report (OU 1) final approval	09/29/2000
Draft Baseline Human Health Risk Assessment (OU 2) submitted	07/28/2004
Draft Groundwater RI submitted (OU 2)	08/02/2004
Draft Groundwater FS submitted (OU 2)	07/30/2004
First Five Year Review	09/2004
Final Groundwater RI submitted	02/11/2005
Ecological Risk Screening Evaluation	06/2005
Final Groundwater FS submitted (OU 2)	07/05/2005
Baseline Human Health Risk Assessment (OU 2) approval	07/05/2005
Public Meeting for 2005 ROD	09/08/2005
Record of Decision (OU 2) signed	09/28/2005
Expanded Ecological Risk Screening Evaluation	06/2006
Long-Term Monitoring Optimization	05/03/2006
Erection of protective fence with signage around wetland pond	02/20/2007
Special Notice Letters for OU 2 and OU 3 issued	03/2009



Event	Date
Good Faith Offer from MEWSTD	05/2009
Consent Negotiations start for CD (OU 2 RD/RA; OU 3 RI/FS & RD/RA)	06/2009

### III. Background

#### Physical Characteristics

Cape Girardeau, Missouri, is a thriving community of about 37,000 permanent residents. Cape Girardeau is located in southeastern Missouri along the Mississippi River. It is a regional hub for education, commerce and medical care. Southeast Missouri State University is located in Cape Girardeau. It is estimated that approximately 90,000 additional people visit Cape Girardeau daily to work, go to school, obtain medical care or shop.

Missouri Electric Works, Inc. (MEW) operated on a 6.4 acre tract adjacent to U.S. Highway 61 (South Kingshighway) in Cape Girardeau. Figure 1 indicates the location of the site within the city limits of Cape Girardeau, Missouri. The site includes all areas which became contaminated with polychlorinated biphenyls (PCBs) originating from MEW's operations. Figure 2 indicates the extent of soil contamination that comprised operable unit 1. Figure 3 indicates all areas that have been impacted by the contamination from the site. The site is located in a predominately commercial/industrial area of Cape Girardeau. The area surrounding the site has experienced significant development since the early 1990s when the site was listed on the National Priorities List (NPL).

The site is situated approximately 1.6 miles west of the Mississippi River. It is located in the hills adjacent to the west valley wall of the Mississippi River flood plain. Intermittent run-off channels emanate from the north, south and east boundaries of the site and eventually drain into the Cape LaCroix Creek which is located 0.7 miles east of the site. The Cape LaCroix Creek flows 1.1 miles to the southeast and enters the Mississippi River. The property is bounded on the north by retail and warehouse properties, on the south by a residence, commercial storage and a construction company, and on the east by a warehouse. A wetland is located approximately 700 feet south of the MEW property. Figure 4 indicates the approximate location of the wetland in relation to the MEW property and the city of Cape Girardeau.

initial  
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Shops on Residual?

## Land and Resource Use

MEW purchased the property in 1952. Prior to that, it is believed that the land was used for agricultural purposes. MEW operated an electrical repair, service, and resell business from the location from 1954 to 1992. The facility discontinued operations in 1992 when the principal of MEW died.

In 2008, Mr. C.J. Morrill, president of Contrend, Inc., acquired the property through a foreclosure sale. According to Mr. Morrill, plans for the property include improvement and redevelopment for commercial uses.

The current land use for the surrounding area is predominantly commercial. Soccer fields are located to the east of the site. New business construction continues near the site. It is expected that the land use in the area will not change significantly. In establishing cleanup requirements for the site, EPA considered the theoretical possibility of an on-site residence. The thermally treated soils were used to backfill the excavations at the site. After soils treatment was complete, a vegetative cover was established to protect the site from erosion.

## History of Contamination

MEW serviced, repaired, reconditioned, and salvaged electrical equipment from 1954 to 1992. Electrical equipment handled during this time consisted of oil-filled electrical transformers, electric motors, electrical equipment controls and oil-filled switches. PCBs, first manufactured in the 1920s, have excellent fire-retardant properties. PCBs were often added to the dielectric fluid in electrical equipment to minimize the potential for fires. The Toxic Substance Control Act (TSCA) of 1978 banned the future manufacture of PCBs and required that electrical equipment containing more than 500 parts per million (ppm) PCB be removed from service. This regulation resulted from studies which indicated that PCBs are a probable human carcinogen, they are extremely stable in the environment (they do not degrade) and they bio-accumulate in the food chain. The products of incomplete combustion of PCBs are dioxins and furans.

During its operational history, MEW reportedly recycled materials from old units, selling copper wire, and reusing the dielectric fluids from the transformers. The salvaged transformer oil was filtered through Fuller's earth for reuse. An estimated 90 percent of the transformer oil was recycled. According to business records obtained from MEW, more than 16,000 transformers were repaired or scrapped at the site during its time of operation. The total amount of transformer oil that was not recycled was estimated to be 28,000 gallons. Information gathered during interviews of former employees indicates that the majority of the nonrecycled oil was disposed of on the site. In 1984, approximately 5,000 gallons of waste oil was removed by a contractor after the TSCA inspection by the Missouri Department of Natural Resources (MDNR).

Industrial solvents were used to clean the electrical equipment being repaired or serviced. Solvents were reused until they were no longer effective. Spills and disposal of spent solvents on the MEW property were described by past employees during EPA-conducted interviews. The MEW and adjacent properties have been found to be contaminated with PCBs.

## Initial Response

The site was discovered in 1984 during a TSCA inspection. PCB contaminated soils and inappropriate storage of over 100 55-gallon drums of PCB-contaminated oils were identified. EPA performed additional investigations to characterize the amount of contamination between 1985 and 1988. EPA issued an administrative order requiring that the owner/operator of the site no longer handle any oil-filled electrical equipment with PCB concentrations greater than 2 ppm, that erosion barriers be placed in all drainage features to minimize the amount of PCB contamination migrating off-site via storm water runoff, and that vegetables grown on site not be sold or given away to anyone outside of the site owner's immediate family.

The site was proposed for inclusion on the National Priorities List (NPL) on June 24, 1988, and finalized on the NPL on February 21, 1990. Former MEW customers were informed of their potential liability beginning in June of 1988. A steering committee of former customers known as the Missouri Electric Works Steering Committee (MEWSC) was formed. The MEWSC performed a Remedial Investigation/Feasibility Study (RI/FS) during 1989 and 1990. The RI/FS was made available to the public during June 1990. The Proposed Plan identifying EPA's preferred remedy was presented to the public during August 1990, starting the period for public comment.

A design RI/FS for the groundwater was required pursuant to the Consent Decree for OU 1 (soils). The Missouri Electric Work Site Trust Donors (MEWSTD) performed the soil RD/RA and the groundwater RI/FS. The RI began in 2000 and continued through 2004. The RI/FS for the groundwater was made available to the public in a Proposed Plan during August 2005, starting the period for public comment.

## Basis for Taking Action

### Contaminants

Hazardous substances that have been released to the site in each media include:

<u>Soil</u>	<u>Groundwater</u>
PCBs	
methylene chloride	1,1,1-trichloroethane
trichloroethene	1,1-dichloroethene
trichloroethane	1,2,4-trichlorobenzene
chlorobenzene	1,2-dichlorobenzene
	1,3-dichlorobenzene
	1,4-dichlorobenzene

PCBs

Sediment

PCBs

Air

PCBs

✓



The risks to human health and the environment represented by the PCB contamination of the soils were evaluated assuming that the site could be used for recreational, residential, or occupational use. Exposure routes included inhalation of PCB-contamination dust or PCB vapors, ingestion of PCB-contaminated soil, or dermal contact with PCB-contamination. The health risks represented by the PCB contamination at the site are unacceptable. The carcinogenic risk represented by the PCB soil contamination at the site for the current use scenario was estimated to be  $1 \times 10^{-3}$ , or one additional cancer for every 1,000 persons. The carcinogenic risk represented by PCB contamination at the site for future residential use of the site was  $1 \times 10^{-2}$ , or one additional cancer for every 100 persons.

A Human Health Risk Assessment (HHRA) of the site was performed by the MEWSC during 1990. The purpose of the HHRA was to assess the risks posed to human health by the contaminants at the site. Contaminants at the Site included: PCB-contaminated soils and sediments, volatile organic compound (VOC) - contaminated soils and sediments, and VOC contamination of the groundwater.

The HHRA evaluated both current and future exposure situations. For purposes of the HHRA, it was assumed that no remedial action would be performed at the Site in order to evaluate the possible future risks posed by the contamination. The following routes of exposure were evaluated: ingestion of PCB-contaminated and VOC contaminated soil/sediment by children and adults; inhalation of PCB-contaminated and VOC-contaminated dust particles/vapors by children and adults; dermal (skin) exposure to PCB-contaminated and VOC-contaminated soil/sediment; and ingestion of VOC-contaminated groundwater by children and adults (future use only). It was assumed that these exposures would occur during the following activities: recreational; residential, and occupational (adults only).

The HHRA indicated that contamination at the Site presented an unacceptable risk to human health and the environment. The principal threat from the Site was due to human exposure to the PCB-contaminated soils. The analyses were based on "most probable case" and "worst case" exposure scenarios. Potential risks associated with exposure to groundwater are attributed to the presence of chlorinated compounds that exist at concentrations that exceed state maximum contaminant levels (MCLs).

A Baseline Human Health Risk Assessment (BHHRA) was performed by the Settling Defendants during 2004 which specifically evaluated the groundwater contaminants associated with MEW activities. Organic chemicals of potential concern (COPCs) were selected from all compounds analyzed in groundwater samples from the Site. COPCs were identified by comparing the maximum concentrations detected with screening toxicity values. A total of fifty-two (52) COPCs were retained and evaluated in the BHHRA. The COPCs are identified in the following table.

## Chemicals of Potential Concern (COPCs)

Detected Organics	Undetected Organics
1,1-Dichloroethane	1,1,2,2-Tetrachloroethane
1,2,4-Trichlorobenzene	1,1,2-Trichloroethane
1,2-Dichloroethene Total	1,2-Dichloroethane
1,3-Dichlorobenzene	1,2-Dichloropropane
1,4-Dichlorobenzene	2,4,6-Trichlorophenol
2-Chlorophenol	2,4-Dinitrotoluene
Aroclor-1260	2,6-Dinitrotoluene
Benzene	3,3-Dichlorobenzidine
Bis(2-Chloroethyl) Ether	4,6-Dinitro-2-Methyl Phenol
Bis(2-ethylhexyl)phthalate	Aroclor 1016
Bromodichloromethane	Aroclor 1221
Chlorobenzene	Aroclor-1232
Chloroform	Aroclor-1242
Naphthalene	Aroclor-1248
N-Nitrosodi-n-propylamine	Aroclor-1254
Tetrachlorethene	Benzo(a)anthracene
Trichlorethene	Benzo(a)pyrene
	Benzo(b)fluoranthene
	Benzo(k)fluoranthene
	Bis(2-Chloroisopropyl) Ether
	Carbon Tetrachloride
	Chlorodibromomethane
	Dibenzo(a,h)Anthracene
	Dibenzofuran
	Hexachloro-1,3-Butadiene
	Hexachlorobenzene
	Indeno(1,2,3-cd)Pyrene
	2-Methylnaphthalene
	Nitrobenzene
	Pentachlorophenol
	Vinyl Chloride
	Bis (2-Chloroethoxy) Methane
	4-Bromophenyl Phenyl Ether
	4-Chlorophenyl Phenyl Ether
	4-Chloro-3-Methylphenol

Quantitative evaluation of the risks associated with these chemicals is not possible due to the absence of available data. These chemicals have not been included in the risk calculations.

Pathways through which populations could potentially become exposed were evaluated. These pathways include: 1) inhalation of the COPCs; 2) ingestion of the COPCs; and 3) dermal (skin) contact with the COPCs. Modeling of groundwater flow was performed for the fractured bedrock and the alluvium. For purposes of the BHHRA, it was assumed that no remedial work would be performed at the Site. This was done so that possible future risks posed by the contamination could be evaluated.

The analyses performed indicated that groundwater impacted by Site contamination presents an unacceptable risk to human health. The calculated human health risks are the result of chemicals released to the environment during the operations of MEW.

## IV. Remedial Actions

### Remedy Selection (OU 1 – Soils)

The 1990 ROD for the site was issued by EPA on September 28, 1990. Remedial Action Objectives (RAOs) were developed as a result of

who not included? -  
No DCL?

data collected during the Remedial Investigation (RI) to aid in the development and screening of remedial technology alternatives to be considered in the 1990 ROD. EPA's national goal for the Superfund program is to select remedies that will be protective of human health and the environment that will maintain protection over time, and that will minimize untreated waste. In establishing remedial goals for the site, EPA considered applicable or relevant and appropriate requirements (ARARs) specific to the contaminants of concern; the HHRA; Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) established under the Safe Drinking Water Act; and EPA guidance and policy, specifically the TSCA PCB Spill Cleanup Policy, 40 C.F.R. Part 761.

#### Source Control Response Objectives

- Minimize the migration of contaminants from site soils.
- Reduce risks to human health by preventing direct contact with and ingestion of contaminants in site soils.
- Minimize the migration of contaminants from the site to the adjacent wetland.

#### Management of Response Objectives

- Eliminate or minimize the threat posed to human health and the environment by preventing exposure to soil, air, and sediment contaminants.
- Prevent further migration of soil contamination beyond the then current site boundaries.
- Restore contaminated groundwater to a state ARARs, which are considered to be protective of human health and the environment, within a reasonable period of time.

The major components of the source control remedy selected in the 1990 ROD included the following:

1. Preparation of the site will be performed by clearing trees and vegetation in the area where the incinerator is to be placed.
2. Excavation and on-site incineration of all soils with PCB concentrations in excess of 10 ppm to a depth of four (4) feet and 100 ppm at depths greater than four (4) feet. Excavated soils will be consolidated on-site with provisions to minimize

migration of the contaminated materials.

3. Mobilization and set-up of the incinerator at the site.
4. Conduct trial burn(s) to ensure the operational capabilities of the incinerator.
5. Monitor continuously incinerator feed rates. Frequent monitoring of incinerator emissions from the incinerator, both ash and gases, to document that destruction efficiencies and air emissions standards are complied with. Testing of the ash residuals from the treatment process will be performed to identify leaching characteristics, to identify the compounds within the ash and to verify that the ash contains less than 2 ppm PCB.
6. Backfill excavated areas using treated soils, after analytical tests confirm that treatment standards are met.
7. De-mobilization of the incinerator from site when treatment of PCB-contaminated soils is complete.
8. Restoration and revegetation of the Site.
9. Impose institutional controls, such as deed restrictions and/or zoning restrictions to limit use of the site to industrial or commercial purposes.



The major components of the migration management remedy selected in the 1990 ROD included (these components were superseded by the remedial action decision made in the 2005 ROD):

1. Perform additional investigation of the hydro-geologic regime in the vicinity of the site to identify the vertical extent of contamination; confirm the presence or absence of a continuous aquiclude within the upper 200-300 feet of the bedrock.
2. Perform pump tests to determine the flow rates and hydraulic conductivity of the aquifer to gather additional data necessary for the design.
3. Design the extraction well network, including well locations, pump sizes, pumping frequency, location and sizes of connecting piping.
4. Sample water extracted during the pump tests for identification of the contaminants and associated concentrations present in the groundwater.
5. Extract and treat groundwater utilizing an extraction well network, temporary storage, followed by removal of volatile organic compounds using an air-stripper with gas phase carbon adsorption from the air stream.
6. Perform Five-Year Reviews to assess Site condition, contaminant distributions, and any associated site hazards.

An Explanation of Significant Differences (ESD) to the ROD was issued by EPA on February 1, 1995. Technologies (thermal desorption) capable of effectively dealing with the contamination at the site had been developed and demonstrated successfully. The MEWSC provided information supporting the ESD as a focused feasibility study in October 1994. The EPA reviewed the information and concurred that thermal desorption was a viable remedial alternative. The EPA notified the public of the proposed change, conducted a meeting in Cape Girardeau, Missouri during December 1994 and issued the ESD. The primary changes documented in the ESD were:

- Changing on-site incineration to on-site thermal treatment; and
- Defining on-site thermal treatment to be either incineration or thermal desorption.

#### **Remedy Selection (OU 2 – Groundwater)**

The 2005 ROD was issued on September 28, 2005. Two distinct groundwater regimes were identified during the RI: groundwater in fractured bedrock and groundwater in alluvium underlying the wetland area. The EPA's national goal for the Superfund program is to select remedies that will be protective of human health and the environment, that will maintain protection over time, and that will minimize untreated waste. The NCP identifies the remedial action expectations for contaminated groundwater at Superfund sites as,

*"EPA expects to return usable groundwaters to their beneficial uses whenever practicable, within a time-frame that is reasonable given the particular circumstances of the site. When restoration of groundwater to beneficial uses is*

*not practicable, EPA expects to prevent further migration of the plume, prevent exposure to the contaminated groundwater and evaluate further risk reduction."* 40 C.F.R. § 300.430(a)(1)(iii)(F).

Based on this expectation, the following general goals are applicable to groundwater remedial actions.

- Prevent exposure to contaminated groundwater which might pose an unacceptable risk
- Prevent or minimize further migration of the contaminant plume
- Prevent or minimize further migration of COCs from source materials to groundwater
- Return groundwater to expected beneficial uses whenever practicable

Remedial action objectives (RAOs) define the extent of cleanup required to protect human health and the environment and to comply with applicable or relevant and appropriate requirements (ARARs). ARARs are categorized as action-specific, chemical-specific, and location-specific. The ARARs for the Site, divided by category, are attached as Appendix B. RAOs will identify the environmental media, the COCs, exposure pathways, and potential receptors and target cleanup levels (TCLs) for each pathway/receptor.

The following are RAOs for groundwater at the Site:

- Prevent exposure of receptors, both in the upland and wetland areas, to fractured, bedrock and alluvial groundwater when COC concentrations exceed TCLs;
- Prevent future use of the aquifer underlying the Site as a source of drinking water;
- Assess and manage the migration of COCs in the fractured bedrock and alluvial groundwater; and
- Assess and manage the migration of COCs from fractured bedrock into the alluvium.

Two groundwater regimes have been impacted by contamination from the site. The impacted groundwater is in the fractured bedrock in the upland area and in the alluvium in the wetland area. A remedy has been identified for each groundwater regime.

As discussed above, EPA has determined that, due to the hydrogeological conditions at the site, it is technically impracticable from an engineering perspective to comply with the relevant and appropriate requirement of achieving MCLs in remediating the groundwater, and accordingly, a TI waiver of this requirement was invoked by EPA in the 2005 ROD.

The major components of the migration management remedy selected for the fractured bedrock groundwater in the 2005 ROD include:

- ICs;
- wellhead treatment (where appropriate); and
- long-term groundwater monitoring.

The TI waiver was needed due to the highly variable and fractured nature of the bedrock in the Upland Area of the site. As anticipated, ICs will be implemented or imposed as appropriate to prevent exposure to the contaminated groundwater. The primary IC is expected to be proprietary in nature, i.e., an Environmental Covenant that complies with, and is enforceable under, Missouri's Environmental Covenants Act (sections 260.1000 - .1039, RSMo). Although EPA believes that an Environmental Covenant is all that would be necessary to protect human health and the environment from contaminated groundwater at the site, other ICs that might be considered for use at the site may include the designation of the area of groundwater contamination as a "special use" area by MDNR's Division of Environmental Quality, ordinances limited resource use and/or public information. Monitoring of groundwater would be performed. This would be accomplished by obtaining groundwater samples from bedrock wells and performing laboratory analysis on the samples for COCs.

The major components of the migration management remedy selected for the alluvium groundwater in the 2005 ROD include:

- ICs;
- wellhead treatment;
- long-term groundwater monitoring; and
- injection of EBD agents into the alluvial groundwater (with a contingent MNA remedy, if groundwater conditions allow). [Do we indicate that that contingency has been met?]

The primary IC is expected to be proprietary in nature, i.e., an Environmental Covenant that complies with, and is enforceable under, Missouri's Environmental Covenants Act (sections 260.1000 - .1039, RSMo). Although EPA believes that an Environmental Covenant is all that would be necessary to protect human health and the environment from contaminated groundwater at the site, other ICs that might be considered for use at the site may include the designation of the area of groundwater contamination as a "special use" area by MDNR's Division of Environmental Quality, ordinances limited resource use and/or public information. Monitoring of groundwater would be performed. This would be accomplished by obtaining groundwater samples from bedrock wells and performing laboratory analysis on the samples for COCs. Agents to accelerate natural biological processes that degrade or break-down COCs would be injected into the alluvial groundwater. Installation of injection wells will be required.

### **Contingent Alluvium Technology**



During June 2005, the analyses performed on alluvial groundwater samples were expanded to include parameters that are used to determine whether or not degradation of chemicals was naturally occurring. These parameters were monitored for one year. Evaluation of the data indicated that the alluvial groundwater can support natural attenuation. Therefore, it was determined that injection of compounds into the groundwater are not be required to attain RAOs.

## Remedy Implementation

### Soils

The Consent Decree (CD) signed by the EPA, the Missouri Department of Natural Resources (MDNR), 175 Settling Defendants and 3 Federal Agencies was referred to the Department of Justice (DOJ) on December 30, 1991. One hundred thirty-four (134) of the Settling Defendants were *de minimis* parties that elected to "cash-out" their liability with regards to either soil or soil and groundwater response actions. The CD was lodged in the Federal District Court for the Eastern District of Missouri, Southeastern Division, in June 1992. It was approved or entered by the Court during August 1994. The CD entry was appealed by a group of non-settling former MEW customers during October 1994. The 8<sup>th</sup> Circuit Court of Appeals reversed the entry of the CD and remanded the CD to the Federal District Court during August 1995 for further deliberation; the CD was approved a second time by the Federal District Court on August 14, 1996. The same group of former customers again appealed the CD entry. The 8<sup>th</sup> Circuit Court of Appeals confirmed entry of the CD during December 1997.

The Remedial Design (RD) was conducted in conformance with the soils response actions identified in the ROD as modified by the ESD. The RD was conditionally approved by EPA on March 25, 1999.

The MEWSC requested that EPA allow it to further investigate groundwater contamination during late 1990. The purpose of the investigation was to "prove" the presence of a confining layer (shale) that would inhibit the downward migration of contaminants in the groundwater. EPA agreed to the investigation. Drilling for the new well began in January 1991. A pilot hole was drilled to about 220 feet to verify the condition of the limestone bedrock. This hole was continuously cored within the bedrock; the quality of the rock was good. The location of the new monitoring well (MW-11) was approximately 10 feet southwest of the pilot boring. While drilling, a solution feature was detected at a depth of about 110 feet below ground surface (bgs). Casing was "seated" in the rock below the void; the boring grouted and re-drilled using a smaller diameter drill bit. A second, larger solution feature about 10 feet high was detected at a depth of about 220 ft. bgs. This void was mud-filled; the mud was sampled, PCB contamination of the mud and water was detected. Again the casing was "seated" in the rock below the void; the boring grouted and re-drilled using a smaller diameter drill bit (this is referred to as telescoping the hole). A third large solution feature was encountered at a depth of about 315 ft. bgs. This void was also mud-filled. Several thousand gallons of the mud-slurry material within the hole was pumped and then sampled. PCB contamination of the sediment-water mixture and water (the solids were removed using a centrifuge) was detected. The hole was telescoped again. The hole was advanced to a depth of 405 ft. bgs. Groundwater was collected and sampled. PCBs were detected at 2 parts per billion (ppb). (The MCL for PCBs in groundwater is 0.5 ppb.)

The new groundwater information resulted in the identification of a significant data-gap. As a result, the CD provided for the clean-up of the PCB-contaminated soils, in accordance with the ROD, and for a focused investigation and feasibility study of the groundwater (“additional investigation of the hydro-geologic regime in the vicinity of the MEW Site will be performed”)

and treatment of the contaminated groundwater within about 70 feet of the ground surface using pump and treat technology. Groundwater response actions identified in the 1990 ROD were not included in the CD due to the lack of information needed for design and cost analysis purposes.

The work identified in the CD took place in two phases; the first was thermal treatment of the PCB-contaminated soils and the second was the focused groundwater study. After several years delay due to legal proceedings, the contract for thermal treatment of the soils was awarded on August 25, 1998. The remedial design was conditionally approved on March 25, 1999. On-site mobilization, clearing and grubbing efforts began on June 7, 1999. Thermal treatment of the PCB-contaminated soils was completed on July 25, 2000. The work for the soils operable unit (OU) was finished with the approval of the Remedial Action Report on September 29, 2000. The major components of the Soils Remedial Action (RA) were:

- Clearing and grubbing of the site,
- Construction of concrete pad for the Low Temperature Thermal Desorption (LTTD) unit.
- Mobilization and set-up of the LTTD unit/
- Excavation of PCB-contaminated soils.
- Screening/processing of PCB-contaminated soils in preparation or thermal desorption.
- LTTD trial runs (process had to meet specified destruction criteria and not create products of incomplete combustion [PICs])
- Review of LTTD trial run(s) data.
- Approval to treat soils using parameters established during trial runs.
- Excavation of deep PCB-contamination (up to 25 ft. bgs) - all soils with PCB concentrations greater than 100 ppm removed from the site (sinkholes were detected on site, with one being at the location of monitoring wells MW-3, MW-5 and MW-11).

- Modification of excavation plan to leave habitat for pair of nesting red-tailed hawks.
- Production treatment of PCB-contaminated soils.
- Backfill and regrading of site.
- Re-vegetation of site.
- Pre-final/Final Inspection.

The pre-final inspection concluded that the soils RA had been conducted and completed in accordance with the soils remedial design plans and specifications; a punch list of additional work items was not needed.

The second phase of the work performed pursuant to the CD consisted of the groundwater investigation and feasibility study. Since the decision was made during the soils RA that all PCBs in excess of 100 ppm would be removed, the soils RA acted as a source removal for the groundwater contamination. Upon completion of the thermal desorption activities, the existing groundwater monitoring wells were sampled on a quarterly basis for about 2 years. During this time, non-invasive investigations were performed to better define the joint patterns within the bedrock. The purpose of the non-invasive work was an attempt to get data to formulate a model of the underlying bedrock. This was made extremely difficult by the fact that the bedrock below the site is karst; solution features have been carved in the bedrock by the groundwater. It is very difficult, if not impossible, to track contaminants within karst bedrock. A model of the bedrock was created. Additional monitoring wells were installed at those locations most likely to be contaminated. These wells, along with the original wells, were monitored for 4 quarters. Groundwater data was analyzed and the decision was made that additional monitoring wells were needed near the northern edge of the wetland area. Three (3) nests of wells were installed. All monitoring wells were sampled quarterly for another year. Chlorinated compounds were detected in the samples from the wetland wells. Two (2) more sets of nested wells were installed further south and west in the wetland area. A third set of nested wells were planned to monitor groundwater east of the wetland area. These wells were not installed due to lack of alluvium in this area. A focused remedial investigation and feasibility study was then submitted to EPA.

The EPA and the state of Missouri have determined that all work identified in the CD has been substantially performed. The EPA issued a separate ROD for groundwater in 2005.

### **System Operation/Operation and Maintenance**

Representatives of the MEWSTD conducted the monitoring and maintenance activities with regard to the vegetative cover over the treated soils. About a year after constructing the cap, a site visit was made to observe the condition of the cap, identify any erosional features and assess



the success of vegetating the cap. Several erosion rills were identified and filled, new grass seed was planted and erosion barrier gabbions) were erected along the eastern-most edge of the site.

No long-term operation and maintenance activities were required in the CD. There are no operation and maintenance activities performed.

## V. Progress Since the Last Five-Year Review

Since the first Five-Year Review for the Site, the following have occurred:

- A groundwater RI/FS has been completed.
- The 2005 Record of Decision has been issued.
- An investigation of the ability of the alluvium groundwater to support MNA has been completed.
- An ecological risk screening evaluation has been completed.
- Fencing and signage of the wetland pond area has been completed.
- Special Notice Letters have been issued for the RD/RA for OU 2 and the RI/FS and RD/RA for OU 3.
- A Good Faith offer has been received from the MEWSTD.
- CD negotiations for work at OU 2 and OU 3 have commenced.

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## **VI. Five-Year Review Process**

### **Administrative Components**

Members of the MEWSTD and the community were notified of the Five-Year Review during February 2009. The MEW Five-Year Review was performed by Daniel Kellerman and Paulette France-Isetts, EPA Remedial Project Managers (RPM). Don Van Dyke of Missouri Department of Natural Resources assisted in the review as the representative for the support agency.

The review schedule components included the following:

- ↗ Community involvement
- ↗ Document review
- ↗ Data review
- ↗ Site inspection
- ↗ Local interviews
- ↗ Five-Year Review report development and review

These efforts were performed from December 2008 through June 2009.

### **Community Involvement**

Activities to involve the community in the Five-Year Review were initiated with a meeting in January 2009 between the RPM Kellerman and the Community Involvement Coordinator (CIC) for the site. A notice was sent to the local newspaper in Cape Girardeau that a Five-Year Review was to be conducted; this notice was published on March 1, 2009. A fact sheet was sent to Federal and state of Missouri Legislators on February 27, 2009. The fact sheet was also mailed 348 interested parties from an updated mailing list. The Fact Sheet invited the recipients to submit any comments to EPA. Following execution by EPA, the Five-Year Review report will be available to the public at the Cape Girardeau Public Library and the EPA Region 7 office.

## **Document Review**

This Five-Year Review consisted of a review of relevant documents including the Remedial Action report, groundwater monitoring data, and ecological screening assessments.. Applicable clean-up standards (as listed in the 1990 ROD and 2005 ROD) were also reviewed. Relevant policy and guidance documents for risks posed by PCBs, both human health and ecological, were also reviewed. The documents reviewed are listed in Attachment 4.

## **Data Review**

### Remedial Action Report

All soils contaminated with PCBs at concentrations in excess of 10 ppm were to be excavated and treated. Approximately 38,000 tons of PCB-contaminated soil were excavated and thermally treated during the soil remedial action. Confirmation composite samples were collected within 143 50' x 50' grids. The average PCB concentration for the confirmation samples was 1.6 ppm; the mean PCB concentration was 0.7 ppm.

### Groundwater Investigation

Groundwater monitoring, as part of the focused groundwater investigation, was conducted at the site from June 2000 through November 2004. No new groundwater monitoring wells were installed at the site for approximately 2 years following the soil remedial action. The purpose of the monitoring was to gather data sufficient to evaluate the impact of the PCB source removal on groundwater quality.

Groundwater samples were analyzed for the following compounds:

- 1,1,1-Trichloroethane (1,1,1-TCA)
- Trichlorethene (TCE)
- Perchlorethene (PCE)
- 1,1-Dichloroethane (1,1-DCA)
- 1,1-Dichloroethene (1,1-DCE)
- 1,2-Dichloroethene (1,2-DCE)
- Benzene
- Chlorobenzene
- Toluene
- Chloroform
- 1,2,4-Trichlorobenzene (1,2,4-TCB)
- 1,2-Dichlorobenzene (1,2-DCB), 1
- ,3-Dichlorobenzene (1,3-DCB)
- 1,4-Dichlorobenzene (1,4-DCB)
- Butyl benzyl phthalate
- Di-n-butyl phthalate
- Bis(2-ethylhexyl phthalate

- PCB unfiltered
- PCBs filtered

Where detected, the concentrations of these parameters have decreased or remained constant, indicating that the majority of the source material was successfully removed. The following contaminants were detected at or above the MCL as promulgated under the federal Safe Drinking Water Act: TCE, PCE, Benzene, Chlorobenzene, and PCBs (unfiltered).

## Wetlands

Chain link security fencing and signage remains intact surrounding the pond. The gate is locked and no location of physical damage to the fencing was observed other than small diameter trees which have fallen across the top of the fence along the north side. The fallen trees could represent a slight compromise to the accessibility component of the structure since the barbed-wire strands are compressed down on the top fence rail.

## **Interviews**

Interviews were conducted with some parties connected to the site. No significant problems regarding the site were identified during the interviews.

## **VII. Technical Assessment**

Question A: Is the remedy functioning as intended by the decision documents?

The review of documents indicates that the soil remedial action is functioning as intended by the ROD and ESD. However, PCBs have been discovered in the groundwater, at depth, and no remedial action has yet been taken to address the threat posed by groundwater. Since no remedial action for groundwater has been implemented, the remedy is not functioning as intended by the ROD and ESD.

The remedy for OU2 is not yet functioning. Implementation is not possible since the consent decree is still being negotiated. The remedy for OU3 (wetland) has not been selected. A security fence was constructed around the wetland pond to minimize potential human aquatic life that may be contaminated with PCBs.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of selection still valid?

The exposure assumptions for human health remain valid. The toxicity data and cleanup levels for PCBs have not changed although there is more data on reproductive toxicity for PCBs now than there was in 1990. The RAOs for the soil cleanup remain

## Changes in Standards To Be Considered

The estimate of ecological risk has been formalized since 1990 when the 1990 ROD was issued. PCBs bio-accumulate and bio-magnify in the food chain. Screening levels for PCBs are quite low. A formal ecological risk assessment should be performed at the site to evaluate the

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threat, if any, posed by the PCBs. Unacceptable ecological risks will need to be addressed and/or managed.

## Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

PCBs, chlorobenzene, PCE, benzene and TCE were detected in the groundwater within the area identified as the site. All five contaminants were detected at concentrations above State and Federal MCLs. The presence of these contaminants in the site was not addressed.

The exposure assumptions used to develop the soils portion of the 1990 Human Health Risk Assessment and the Health Risk Assessment included both current and future exposures (child recreational, child residential, adult recreational, adult worker). There have been no changes in the toxicity factors for the contaminants of concern that were used in the Assessment. These assumptions are considered to be conservative and reasonable in evaluating the human health risk a health risk-based cleanup levels. No changes to the assumptions, or the cleanup levels developed from them, is warranted health.

Baseline Risk Assessment now includes human health and ecological risk assessment. Ecological risk was not estimated in 1990. Investigation of the wetland soils, sediments, surface water and soils within about 4 feet of the ground surface need to be sampled and analyses performed to evaluate the risk, if any, to the environment posed by the site.

## Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Several karst features were detected at, near or below the site after the 1990 ROD was issued. Two (2) sink-holes were found; one off-site and the other near the location of MW-3, MW-5 and MW-11A. During the installation of MW-11A, subsurface voids (solution features) were encountered at depths of 110 feet below ground surface (bgs), 220 feet bgs and 315 feet bgs. This information may result in the groundwater remedial action, selected in 1990, being impractical to implement.

## Technical Assessment Summary

According to the data reviewed, the site inspection and the interviews, the soil remedy is functioning as intended by the ROD, as modified by the ESD. The groundwater remedy has not been implemented. There have been no changes in the physical conditions of the site that would affect the protectiveness of the soil remedy. The ARARs for soil contamination cited in the ROD have been met. There have been no changes in the toxicity factors for the contaminants of concern that were used in the Human Health Risk Assessment; there has been no change in the standardized-risk assessment methodology for human health. There has been a change in the methodology for ecological risk; this could impact the protectiveness of the remedy. A groundwater RI/FS has been completed and the selected remedial actions for groundwater at the site have not been implemented. Risk posed by groundwater still exists.

Is the remedy  
different?  
account?

Is the methodology for ecological risk; this affected the selected remedial negotiations for these efforts are